Contract DACA21-85-C-0587

ENERGY SURVEY
OF
ARMY LAUNDRY FACILITIES
FORT JACKSON, SOUTH CAROLINA

EXECUTIVE SUMMARY

1985

Submitted To
DEPARTMENT OF THE ARMY
SAVANNAH DISTRICT CORPS OF ENGINEERS
SAVANNAH, GEORGIA

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EXECUTIVE SUMMARY

The purpose of this study is to evaluate the technical and economic feasibility of energy conservation opportunities at the Fort Jackson Laundry Facility. This study was conducted under Contract Number DACA21-85-C-0587 entitled "Energy Survey of Army Laundry Facilities, Fort Bragg, North Carolina and Fort Jackson, South Carolina." The Fort Jackson portion of this study was initiated on March 26, 1986 by letter from Jerry T. Hines, Lieutenant Colonel, Corps of Engineers.

CURRENT OPERATING CHARACTERISTICS

The Fort Jackson laundry facility is identified as Building Number 1561 and is located on Washington Road.

The laundry facility consists of 6,480 square feet of office space and 43,740 square feet of factory space for a total facility area of 50,220 square feet. The laundry facility maintenance engineer starts the plant up each day at 6:30 a.m. and shuts the plant down at 4:30 p.m. five days per week, fifty weeks per year. This operating schedule results in a total of 2500 hours of operation per year. The laundry facility washes, dries, and presses 5,317,800 pieces of clothing, sheets and blankets each year. Figure 1 illustrates the laundry facility production by month for the past year.

The laundry facility consumes electricity, natural gas and steam energy. Table 1 gives a breakdown of the unit costs for the individual energy sources used at the laundry.

Table 1. Energy Unit Costs

Energy Source	$/Unit	$/MBTU
Electricity		
Demand	$ 9.76/KW	--
Usage	$ 0.026/KWH	7.62
Steam		
Usage	$ 5.15/1000 lb	5.92
Natural Gas		
Usage	$ 0.493/Therm	4.93

LAUNDRY PRODUCTION BY MONTH

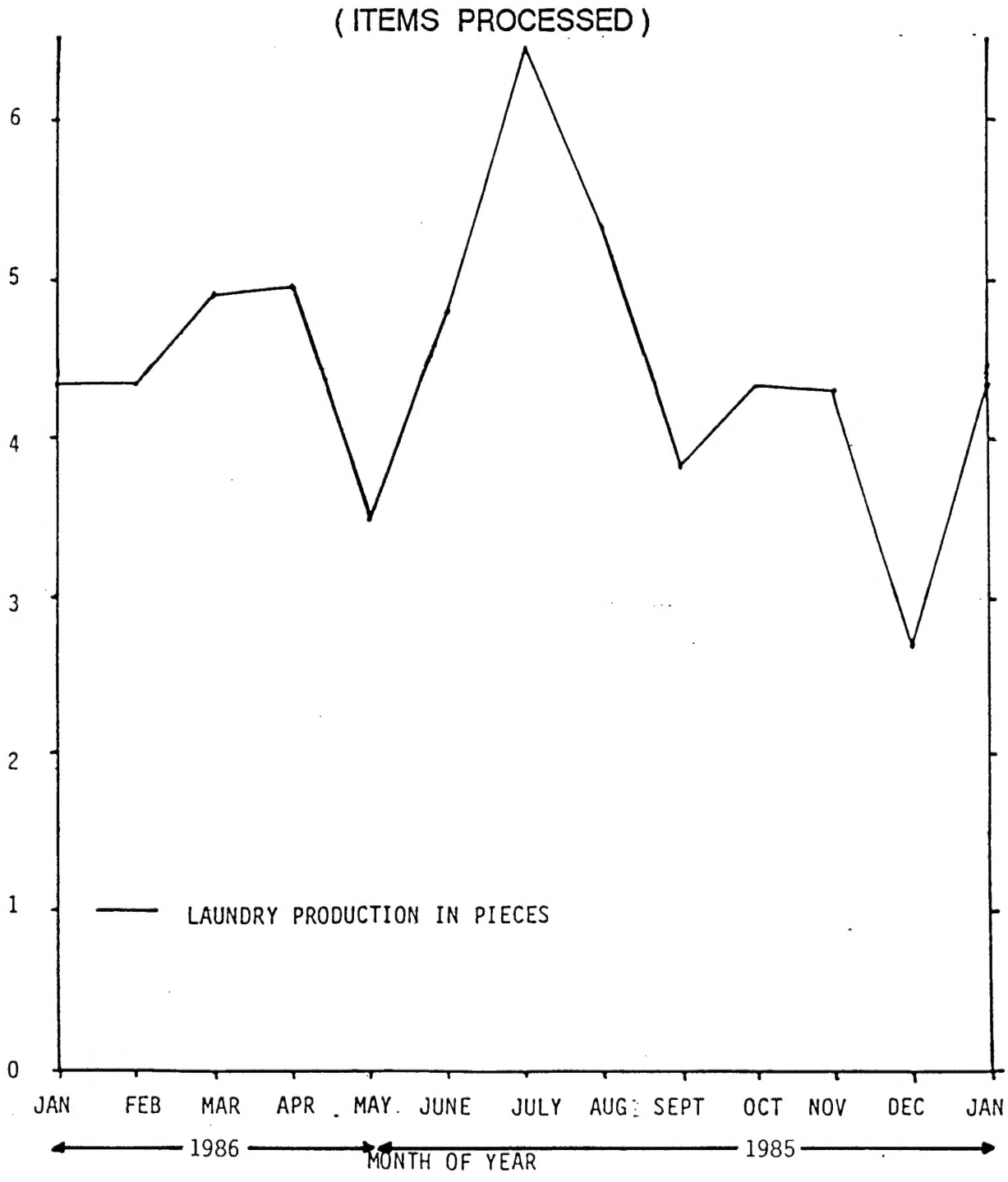

FIGURE 1

Electricity and natural gas are consumed directly from South Carolina Electric and Gas Company. Steam is produced by the combustion of natural gas at Energy Plant 3 and supplied to the laundry facility. Heat is removed from the steam forming condensate. The condensate is combined with makeup water and supplied to the energy plant. The laundry facility consumed 32,565.9 million British thermal units (MBTU) of energy during the past year. Figure 2 illustrates the laundry facility energy consumption by month for the past year. Figure 3 illustrates the breakdown of the three sources of energy supplied to the laundry facility relative to the total energy consumption. Steam energy accounts for 87%, electricity 7% and natural gas 6% of the total energy consumption of the laundry facility. Energy costs of the laundry facility account for $194,837.33 per year of the annual operating costs.

During the study, the energy consumption for each piece of equipment by energy source was obtained. Figure 4 contains a breakdown of the electrical energy consumption by end use equipment. Figure 5 contains a breakdown of the natural gas energy consumption by end use equipment. Figure 6 contains a breakdown of the steam energy consumption by end use equipment.

LAUNDRY ENERGY CONSUMPTION BY MONTH

(MBTU)

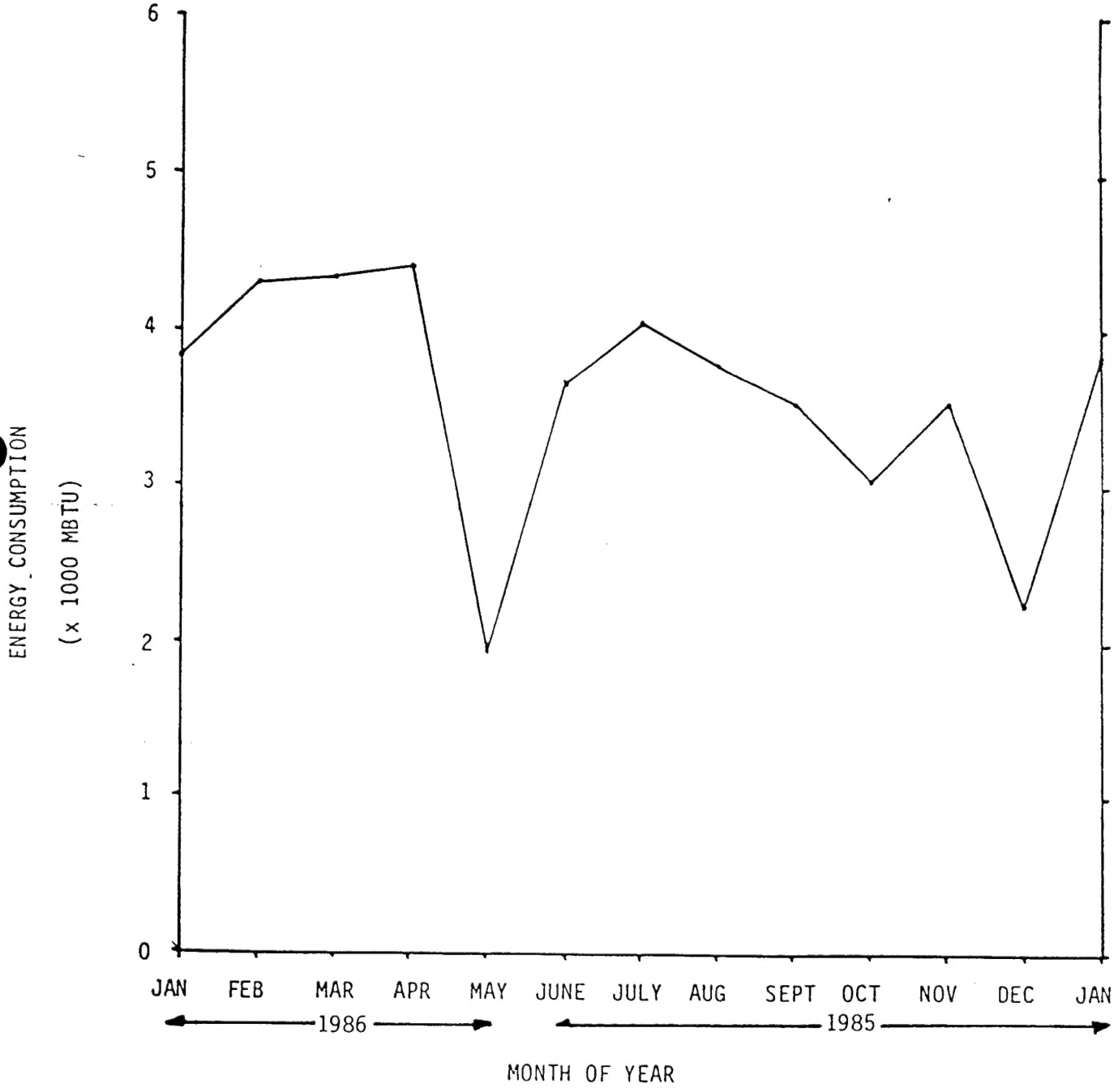

FIGURE 2

LAUNDRY ENERGY CONSUMPTION BY SOURCE

(TOTAL CONSUMPTION = 32,565.9 MBTU)

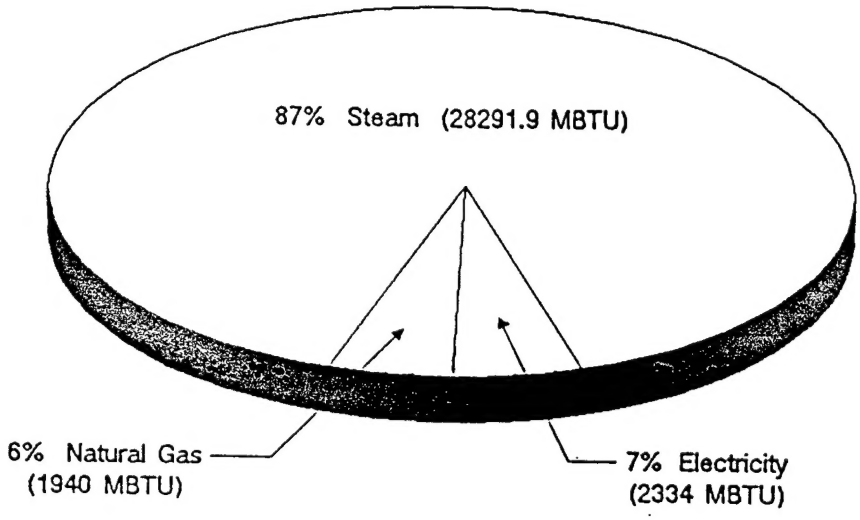

FIGURE 3

LAUNDRY ELECTRICAL ENERGY BALANCE

(TOTAL CONSUMPTION = 2334 MBTU)

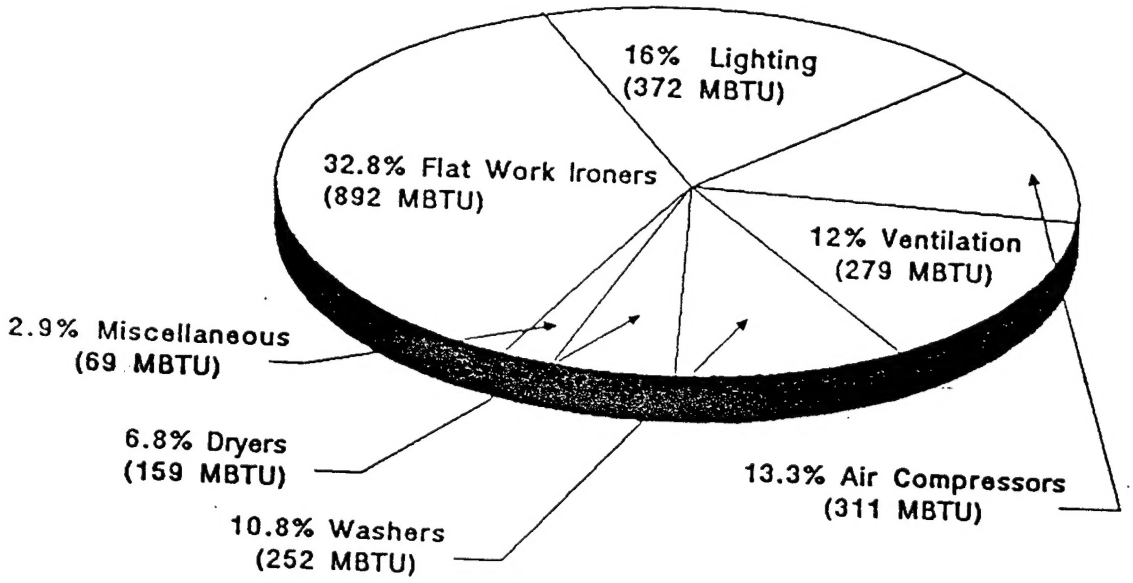

FIGURE 4

LAUNDRY NATURAL GAS ENERGY BALANCE

(TOTAL CONSUMPTION = 1940 MBTU)

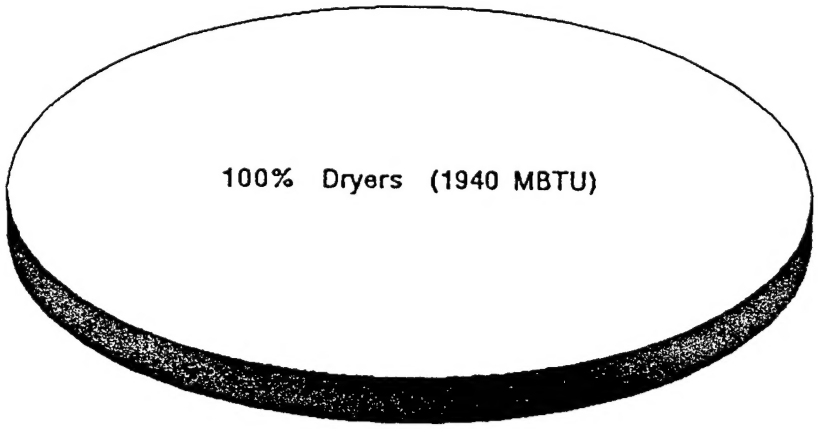

FIGURE 5

LAUNDRY STEAM ENERGY BALANCE

(TOTAL CONSUMPTION = 28292 MBTU)

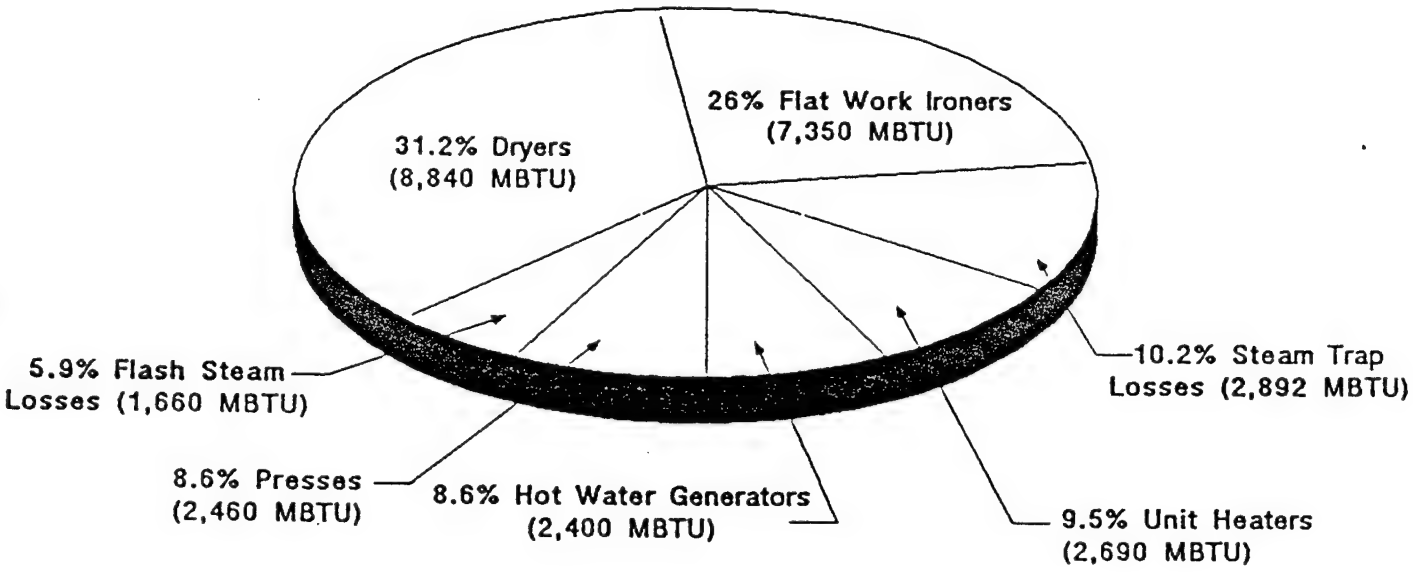

FIGURE 6

ENERGY CONSERVATION OPPORTUNITIES

The purpose of this study is to evaluate the technical and economic feasibility of energy conservation opportunities at the laundry facility. Table 2 contains the energy conservation opportunity's project titles along with the total energy savings, yearly cost savings, installed cost, simple payback in years and savings-investment ratio. Figure 7 illustrates the combined effect of the recommended energy conservation opportunities as compared to the laundry facility base energy consumption. Our estimates indicate a savings of approximately 24.7 percent over the base year (1986).

Table 2. Summary of Energy Conservation Opportunities

Project		Energy Savings (MBTU/yr)	Cost Savings ($/Year)	Installed Cost ($)	Simple Payback (Years)	Savings Invest Ratio
1.	Change in operating hours					
	A. Under current contracted demand	0	4,703.16	0	0.0	Infinite
	B. Under proposed racheted demand	0	12,238.20	0	0.0	Infinite
X 2.	* Cold water laundering	G 1,337.7	7,919.18	0	0.0	Infinite
3.	Flat work ironer shut down	E 317.3 G 2,371.7	16,457.50	2,321.00	0.1	156.2
4.	Pants press automatic valve	G 83.2	492.54	309.47	0.6	37.7
5.	Coat dryer automatic valve	G 192.6	1,140.37	1,338.06	1.2	20.2
6.	* Flash steam heat recover					
	A. Implementation without rinse water reuse	G 4,578.0	27,101.76	44,853.32	1.7	14.3
f	B. Implementation with rinse water reuse	G 3,875.7	22,945.00	44,853.32	2.0	12.1
7.	Steam and condensate piping insulation	G 102.1	604.44	1,836.45	3.0	7.8
8.	Unit heater automatic valves	G 403.5	2,388.80	8,471.65	3.5	6.7
9.	Rinse water reuse	G 312.0	1,847.00	16,014.90	8.7	2.7
	TOTALS**	8048.4	60,423.61	59,129.95	1.0	9.4

* Only one of these recommendations can be implemented.
** Totals do not include savings from cold water laundering and rinse water reuse.
***E = Electric Energy Savings; G = Natural Gas Energy Savings

ENERGY SAVINGS FOR LAUNDRY

(TOTAL CONSUMPTION = 32,565.9 MBTU)

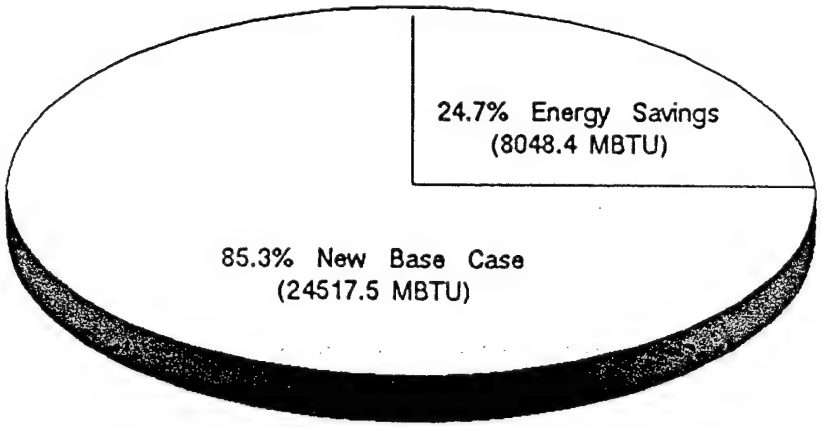

FIGURE 7

Energy conservation opportunities for the laundry facility include:

1. CHANGE IN OPERATING HOURS

This audit team recommends changing the laundry facility's operating hours from 6:30 a.m. - 4:30 p.m. to 2:00 a.m. - 12:00 noon during the months of June through September. Based on the racheted demand charges imposed on Fort Jackson by South Carolina Electric and Gas, large savings in the cost of electricity can be achieved.

2. COLD WATER LAUNDERING

The audit team recommends changing the laundry washing operation from hot water washing to cold water washing. Currently the hot water is generated by steam and large savings in steam consumption can be achieved by implementing this recommendation. This recommendation can not be implemented if recommendation number 6 is implemented and vice-versa.

3. FLAT WORK IRONER SHUTDOWN

The audit team recommends that one flat work ironer be shut down permanently and a second flat work ironer be shut down except during emergencies. Implementation of this recommendation will result in saving electrical and steam energy.

4. PANTS PRESS AUTOMATIC VALVE

The audit team recommends that two pants press stations be retrofitted with automatic steam valves. The valves will restrict steam from entering the heat transfer area when the units are not being used. Implementation of this recommendation will result in saving steam energy.

5. COAT DRYER AUTOMATIC VALVE

The audit team recommends that the two coat dryers be retrofitted with automatic steam valves. The valves will restrict steam from entering the heat transfer area when the units are not being used. Implementation of this recommendation will result in saving steam energy.

6. FLASH STEAM HEAT RECOVERY

The audit team recommends that heat recovery from flashed steam which is presently vented to the atmosphere be implemented. The heat recovered will be used to produce the hot water to be used in the laundry washing operations. Implementation of this recommendation will result in saving steam energy. This recommendation can not be implemented if recommendation number 2 is implemented and vice-versa.

7. STEAM AND CONDENSATE PIPING INSULATION

The audit team recommends that insulation be installed on portions of the steam and condensate piping network which is currently uninsulated.

8. UNIT HEATER AUTOMATIC VALVES

The audit team recommends that unit heaters be retrofitted with automatic steam valves. The valves will restrict steam from entering the heat transfer area when the units are not being used. Implementation of this recommendation will result in saving steam energy.

9. RINSE WATER REUSE

The audit team recommends that rinse water be reused in the wash cycle for laundry washing. Implementation will result in reductions in energy for hot water generating.

RESULTS AND RECOMMENDATIONS

The purpose of this study is to evaluate the technical and economic feasibility of energy conservation opportunities at the laundry facility. Table 2 contains the energy conservation opportunities' project titles along with the total energy savings, yearly cost savings, installed cost, simple payback in years and savings-investment ratio.

The audit team recommends that the following energy conservation opportunities be implemented.

1. Change in operating hours
   This recommendation should be implemented immediately to take advantage of the demand savings benefit during the four summer months.
3. Flat Work Ironer Shutdown
4. Pants Press Automatic Valve
5. Coat Dryer Automatic Valve
6. Flash Steam Heat Recovery
7. Steam and Condensate Piping Insulation
8. Unit Heater Automatic Valves

Implementing these recommendations will result in 317.3 MBTU per year electrical savings and 7,731.1 MBTU per year natural gas savings for $60,423.61 per year savings. The recommendations will cost $59,129,95 to install producing a 1.0 year simple payback and a 9.4 savings-investment ratio.

The projects should be lumped together for funding purposes. A "Documentation for Productivity Capital Investment Programs" funding package was completed for projects 3, 4, 5, 6, 7 and 8 under the "Quick Return on Investment Program (QRIP)" and is contained in Appendix 1.16.